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1. A data acquisition and telemetry system, comprising:
 - (a) at least one probe in communication with at least one medium of interest; and
 - (b) a reader, said reader transmitting at least one excitation signal having at least an energy component to said at least one probe, said at least one probe using said energy component of said excitation signal to:
 - (i) measure at least one parameter of said at least one medium of interest; and
 - (ii) transmit at least one data signal, said at least one data signal being received by said reader.
2. The data acquisition and telemetry system according to Claim 1, wherein said at least one data signal comprises a digital carrier signal modulated to indicate a measured value of said at least one parameter.
3. The data acquisition and telemetry system according to Claim 2, wherein said digital carrier signal is at least frequency modulated.
4. The data acquisition and telemetry system according to Claim 1, wherein said at least one excitation signal comprises a modulated carrier signal.

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5. The data acquisition and telemetry system according to Claim 1, wherein said at least one data signal has a frequency corresponding to a measured value of said at least one parameter.

6. The data acquisition and telemetry system according to Claim 1, wherein said energy component of said at least one excitation signal comprises radio frequency energy.

7. The data acquisition and telemetry system according to Claim 1, wherein said at least one excitation signal and said at least one data signal have substantially different frequencies.

8. The data acquisition and telemetry system according to Claim 1, wherein said at least one excitation signal and said at least one data signal have substantially equal frequencies.

9. The data acquisition and telemetry system according to Claim 8, wherein said reader comprises blocking circuitry, said blocking circuitry substantially preventing said at least one excitation signal transmitted by said reader from being received by said reader.

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10. The data acquisition and telemetry system according to Claim 1, wherein said at least one medium of interest comprises soil.

11. The data acquisition and telemetry system according to Claim 10, wherein said at least one parameter comprises moisture content of said soil.

12. The data acquisition and telemetry system according to Claim 10, wherein said at least one parameter comprises soil matrix water potential.

13. The data acquisition and telemetry system according to Claim 1, wherein said at least one probe and said reader each comprise respective means for receiving and transmitting signals, said respective means for receiving and transmitting signals cooperating with each other to establish an inductive couple between said at least one probe and said reader, said inductive couple facilitating at least transfer of data and energy between said at least one probe and said reader.

14. The data acquisition and telemetry system according to Claim 13, wherein each of said respective means for receiving and transmitting signals comprises at least one transmit/receive coil.

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1 15. The data acquisition and telemetry system according to Claim 13, wherein
2 each of said respective means for receiving and transmitting signals comprises at least
3 one antenna.

1 16. The data acquisition and telemetry system according to Claim 1, wherein
2 said at least one excitation signal is selectively transmitted by said reader.

1 17. The data acquisition and telemetry system according to Claim 1, wherein
2 said reader converts said at least one data signal to corresponding moisture content data.

1 18. The data acquisition and telemetry system according to Claim 1, wherein
2 said at least one excitation signal further comprises a data component.

1 19. The data acquisition and telemetry system according to Claim 18, wherein
2 said data component comprises at least one instruction for execution by said at least one
3 probe.

1 20. A data-acquisition-and-telemetry control system for facilitating
2 substantially real-time management of an object system, comprising:

3 (a) at least one probe in communication with at least one medium of
4 interest;

5 (b) a reader; and

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3 receiving and transmitting signals, said respective means for receiving and transmitting
4 signals cooperating with each other to establish an inductive couple between said at least
5 one probe and said reader, said inductive couple facilitating at least transfer of data and
6 energy between said at least one probe and said reader.

1 25. The data acquisition and telemetry system according to Claim 24, wherein
2 each of said respective means for receiving and transmitting signals comprises at least
3 one transmit/receive coil.

1 26. The data acquisition and telemetry system according to Claim 24, wherein
2 each of said respective means for receiving and transmitting signals comprises at least
3 one resonant antenna.

1 27. The data acquisition and telemetry system according to Claim 20, wherein
2 said reader further comprises a data link, said data link facilitating download of data
3 obtained from said data signal to at least one remote site.

1 28. The data acquisition and telemetry system according to Claim 20, wherein
2 said at least one remote site comprises a website on a global computer network.

1 29. The data acquisition and telemetry system according to Claim 20, further
2 comprising a feedback loop between said control module and the object system, said
3 control module using said feedback loop at least to monitor object system responses.

30. A probe for use in conjunction with a reader to facilitate measurement of
moisture content of soil, comprising:

- (a) a body; and
- (b) at least one electronic circuit attached to said body and being in
operative communication with the soil, said at least one electronic circuit using an energy
component of an excitation signal transmitted to the probe by the reader to measure the
moisture content of the soil and to transmit a data signal to the reader, said data signal
indicating the moisture content of the soil.

1 31. The probe according to Claim 30, wherein said at least one electronic
2 circuit comprises at least one energy storage capacitor, said at least one energy storage
3 capacitor storing energy from said energy component and releasing stored energy when
4 said stored energy reaches a predetermined level so as to cause at least a portion of said at
5 least one electronic circuit to resonate and transmit said data signal, said data signal
6 having a frequency substantially different than that of said excitation signal.

32. The probe according to Claim 30, wherein said energy component causes
said electronic circuit to resonate so that said data signal transmitted by said at least one

3 electronic circuit has a frequency substantially equal to a resonant frequency of said at
4 least a portion of said at least one electronic circuit.

1 ~~33.~~ The probe according to Claim 32, wherein said at least one electronic
2 circuit comprises an inductive loop and a moisture sensing capacitor.

1 ~~34.~~ The probe according to Claim 33, wherein said moisture sensing capacitor
2 has a capacitance which varies according to the moisture content of the soil so that said
3 resonant frequency of said at least one electronic circuit is primarily determined by said
4 capacitance of said moisture sensing capacitor.

1 ~~35.~~ The probe according to Claim 30, wherein said at least one electronic
2 circuit comprises a variable frequency oscillator, said energy component causing said
3 variable frequency oscillator to resonate so as to produce said data signal, said data signal
4 having a frequency substantially equal to a resonant frequency of said variable frequency
5 oscillator.

1 ~~36.~~ The probe according to Claim 35, wherein said variable frequency
2 oscillator comprises at least one moisture sensing capacitor having a capacitance which
3 varies according to the moisture content of the soil proximate to the probe so that said
4 resonant frequency of said variable frequency oscillator is primarily determined by said
5 capacitance of said moisture sensing capacitor.

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6 37. The probe according to Claim 36, wherein said moisture sensing capacitor
7 comprises a hydrophilic dielectric.

1 38. The probe according to Claim 37, wherein said hydrophilic dielectric of
2 said moisture sensing capacitor substantially comprises said soil.

1 39. The probe according to Claim 30, wherein said at least one electronic
2 circuit comprises at least one moisture sensing capacitor having a capacitance which
3 varies according to the moisture content of the soil, and said moisture sensing capacitor
4 producing a discharge signal analogous to the moisture content of the soil so as to
5 facilitate production of said data signal.

1 40. The probe according to Claim 39, wherein said at least one electronic
2 circuit converts said discharge signal of said capacitor into a carrier signal and modulates
3 said carrier signal so as to produce said data signal.

41. The probe according to Claim 30, wherein said at least one electronic
circuit demodulates a data component of said excitation signal so as to extract at least one
instruction from said data component.

1 42. A moisture mapping system for facilitating a substantially real-time
2 determination of moisture content of a zone of interest, comprising:

(a) at least one probe in communication with the zone of interest;

(b) a reader selectively transmitting an excitation signal to said at least one probe, said at least one probe using an energy component of said excitation signal to measure the moisture content of the zone of interest and to transmit a corresponding data signal to said reader, said corresponding data signal indicating the moisture content of the zone of interest, said reader processing said data signal so as to determine a corresponding value of the moisture content of the zone of interest, said reader storing said corresponding value of the moisture content of the zone of interest, said corresponding value of the moisture content of the zone of interest comprising a moisture map of the zone of interest; and

(c) means for transporting said reader throughout the zone of interest so as to place said reader in operative communication with said at least one probe.

43. The moisture mapping system according to Claim 42, wherein said excitation signal and said data signal are digital, and said processing of said data signal by said reader comprises demodulation of said data signal.

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1 45. The moisture mapping system according to Claim 42, wherein said means
2 for transporting said reader comprises an irrigation system.

1 46. The moisture mapping system according to Claim 42, wherein said reader
2 and said at least one probe each comprise a respective transmit/receive antenna, said
3 respective transmit/receive antennas cooperating to facilitate formation of an inductive
4 couple between said reader and said at least one probe, said inductive couple facilitating
5 transfer of at least data and energy between said reader and said at least one probe.

1 47. A precision irrigation system for facilitating substantially real-time
2 moisture content evaluation and irrigation of an agricultural field, comprising:

3 (a) a plurality of probes in operative communication with the
4 agricultural field;

5 (b) a reader, said reader transmitting an excitation signal to said
6 plurality of probes, an energy component of said excitation signal causing each probe that
7 receives said excitation signal to determine moisture content of soil proximate to said
8 each probe, respectively, and said energy component causing said each probe to transmit
9 a data signal corresponding to said moisture content to said reader;

10 (c) a mobile irrigation structure having a plurality of nozzles attached
11 thereto, said plurality of nozzles being in fluid communication with a water source, and
12 said mobile irrigation structure transporting said reader throughout the agricultural field

13 so as to facilitate operative communication between said reader and said plurality of
14 probes; and

15 (d) a control module in operative communication with said reader and with
16 said plurality of nozzles, said control module sending at least one control signal to said
17 plurality of nozzles so as to regulate flow of water therefrom, said control signals
18 corresponding to moisture content data gathered by said reader from said plurality of
19 probes.

1 ~~48.~~ The precision irrigation system according to Claim 47, wherein said
2 mobile irrigation structure comprises a center pivot irrigation system.

1 ~~49.~~ The precision irrigation system according to Claim 47, wherein said
2 mobile irrigation structure comprises a linear move irrigation system.

1 ~~50.~~ The precision irrigation system according to Claim 47, wherein each of
2 said plurality of nozzles is configured for individual control.

1 ~~51.~~ The precision irrigation system according to Claim 47, wherein said
2 excitation signal further comprises a data component, said data component carrying at
3 least one instruction from said reader to said plurality of probes.

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~~54.~~ The method according to Claim 53, wherein establishment of said inductive couple is facilitated by transporting said reader into operative communication with said at least one probe.

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~~55.~~ The method according to Claim 53, wherein establishment of said inductive couple is facilitated by transporting said at least one probe into operative communication with said reader.

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~~56.~~ The method according to Claim 53, wherein at least steps (b) through (f) are performed substantially in real time.

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~~57.~~ The method according to Claim 53, wherein steps (b) through (f) are performed substantially continuously.

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~~58.~~ The method according to Claim 53, further comprising the step of monitoring said at least one corresponding response by the object system.

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~~59.~~ The method according to Claim 53, further comprising the step of using said reader to transmit data to said at least one probe by way of said inductive couple so as to facilitate control of said at least one probe by said reader.

1 60. The method according to Claim 53, wherein said step of processing said
2 data signal received by said reader comprises demodulating said data signal.

1 61. The method according to Claim 53, wherein at least steps (b) and (c) occur
2 substantially simultaneously.

1 62. A soil moisture sensor for measuring moisture content of soil in an
2 agricultural field, comprising:

3 (a) a plurality of probes, each of said plurality of probes having an
4 electronic circuit with a moisture sensing capacitor in operative communication with the
5 soil, each said moisture sensing capacitor having a hydrophilic dielectric so that
6 capacitance of each said moisture sensing capacitor varies so as to at least indirectly
7 correspond to the moisture content of the adjacent soil, and each of said plurality of
8 probes having a tuned circuit receive/transmit antenna; and

9 (b) a reader, said reader having at least one tuned circuit
10 receive/transmit antenna selectively transmitting a digital excitation signal to each said
11 tuned circuit receive/transmit antenna of said plurality of probes, said digital excitation
12 signal cooperating with said at least one tuned circuit receive/transmit antenna of said
13 reader and respective tuned circuit transmit/receive antennae of said plurality of probes so
14 as to facilitate establishment of an inductive couple between said reader and said plurality
15 of probes, an energy component of said digital excitation signal energizing at least a
16 portion of each of respective said electronic circuits so that respective said moisture

17 sensing capacitors each produce an analog signal corresponding to the moisture content
18 of the adjacent soil, each of said plurality of probes then converting respective said
19 analog signals to respective digital carrier signals and modulating said respective digital
20 carrier signals so as to produce a digital data signal indicating moisture content of the
21 adjacent soil, each of said plurality of probes then using respective said transmit/receive
22 antennae to transmit respective said digital data signals to said reader.

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